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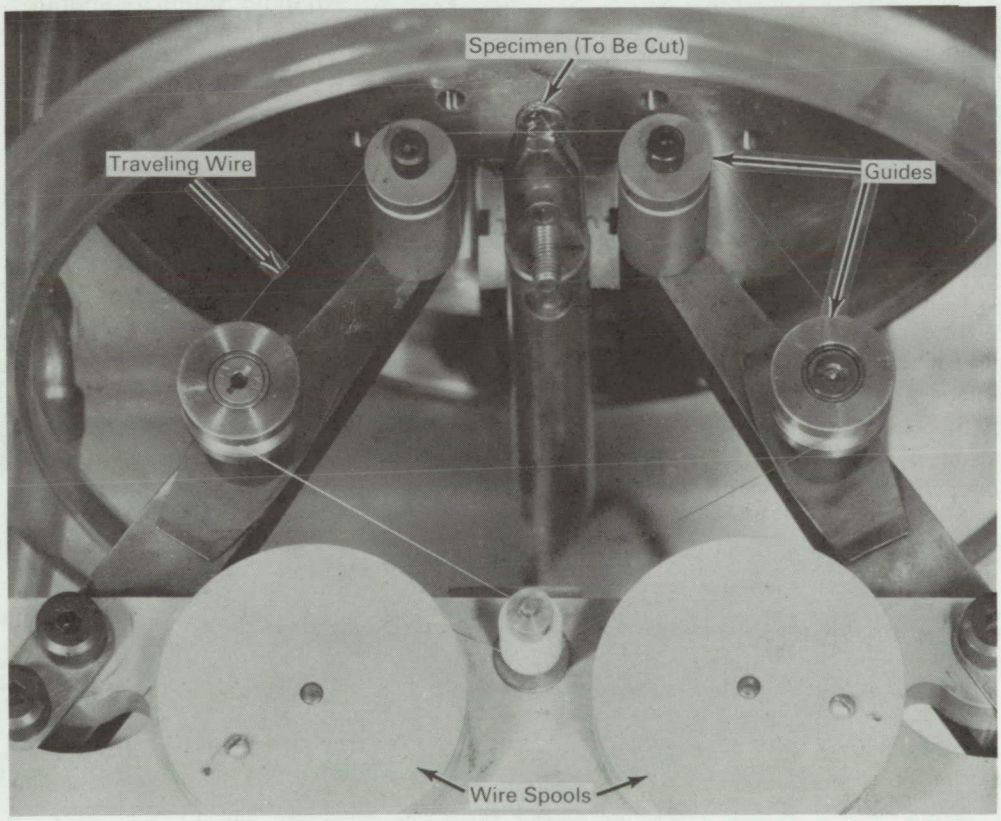
AEC-NASA TECH BRIEF

Traveling Wire Electrode Increases Productivity of Electrical Discharge Machining (EDM) Equipment



The problem:

To increase the productivity of electrical discharge machining (EDM) equipment. When cutting hard materials, such as rare earth metals and meteoric specimens, the plate electrode normally used for EDM cutting requires frequent replacement. In addition, the plate electrode tends to distort, making it difficult to maintain tight tolerances.

The solution:

A traveling wire electrode, used instead of plate electrodes, on the EDM equipment to reduce the time requirements for precision cutting. This device enables

(continued overleaf)

cutting with a minimum of lost material and without inducing stress beyond that inherent in the material. The use of wire reduces the problem of electrode distortion, and permits tighter tolerances to be maintained.

How it's done:

A modified EDM unit is equipped with a traveling wire electrode fixture. The single brass or copper wire, 100 feet or more long and as small as 0.005 inch in diameter, is spool-fed. The wire is fed at 10 to 15 inches per minute and at approximately 5 to 7 pounds tension, depending on the wire diameter used. The fixture has a mechanism which reverses the direction of the wire so that it can traverse from one spool to the other several times before excessive erosion from cutting causes it to break and necessitate replacement. The wire is supported by two sets of guides which can be adjusted to accommodate various sizes of objects to be cut. A dielectric solution is circulated within a container surrounding the cutting area to flush away machined particles.

Because of the size of the wire and the characteristic changing electrode contact of the moving wire, the problem of electrode distortion is practically eliminated. Thus, the cutting is more accurate and tighter tolerances can be maintained. Time and cost savings are realized because of the lower rejection rate.

In addition to reducing downtime for electrode replacement, time requirements for cutting are reduced because of the continuous cutting action of the wire. Machined particles tend to be carried away from the cut by the wire, resulting in a relative absence of contamination of the dielectric solution. This reduces the occurrence of "electrode hunting," a condition caused by the presence of particles in the dielectric, and provides a superior flushing capability.

Notes:

1. The traveling wire technique has been used to cut rare earth metals, invaluable meteoric specimens, and radioactive materials. It has also been applied to the machining of metal bars of Incoloy 718 and tungsten.
2. A plutonium hood has been fabricated to cover the machining area and provide an inert atmosphere for cutting radioactive materials.
3. Additional details are contained in: *Tool & Mfg. Engineering,* Amer. Soc. Tool & Mfg. Engineers, p. 167, April 1966.
4. Inquiries concerning this innovation may be directed to:

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   Argonne National Laboratory
   9700 South Cass Avenue
   Argonne, Illinois 60439
   Reference: B67-10238
   Source: J. Kotora, Jr. and S. V. Smith
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   (ARG-136)

Patent status:

Inquiries about obtaining rights for commercial use of this innovation may be made to:

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